Impact of Climate Change on Hydrogeochemical characteristics of lakes in the Valley of Lakes, southern Mongolia

S.ARIUNBILEG[1], V.P.ISUPOV[2], A.G.VLADIMIROV[3], A.ORKHONSELENGE[4*], S.S.SHATSKAYA[2]

[1]Institute of Paleontology & Geology, Mongolian Academy of Sciences, Ulaanbaatar, Mongolia. ariunbilegsodov@yahoo.com
[2]Institute of Solid State Chemistry & Mineralogy, SB RAS, Novosibirsk, Russia. isupov@solid.nsc.ru
[3]Institute of Geology & Mineralogy, SB RAS, Novosibirsk, Russia. vladimir@igm.nsc.ru
[4]Laboratory of Geochemistry & Geomorphology, National University of Mongolia, Ulaanbaatar, Mongolia. rkhnslng@num.edu.mn

This study presents hydrogeochemical characteristics of lakes in the Valley of Lakes of the Govi region in southern Mongolia. The Valley of Lakes, locating in the elevated valley at 1045-1332 m a.s.l. in the Neogene basin, is one of the most vulnerable regions within the nation challenging to the present climate change. The Valley of Lakes covers extensive areas of the many small lakes, remains of a stable paleolake for extended periods. It has been observed that some of these lakes have recently shrunk due to global warming. In the most lakes in the Valley of Lakes, water levels are dropped and water components are geochemically changed. Results from microchemical analyses of the lake water show that relatively thick saline layer has covered water surface and mineralization of lake water has been increased in Lake Biger. Its recent shrinkage has impacted on the cation ratio (from $Na^{+}>Mg^{+2}>K^{+}>Ca^{+2}$ to $Mg^{2+}>Ca^{2+}>Na^{+}+K^{+}$) and increase in concentrations of S-As and Sr. In Lake Buun Tsagaan and Lake Orog, lake water has cation ratio of $Ca^{2+}>Na^{+}+K^{+}>Mg^{2+}$. U and Li are increased in saline Lakes Burd, Zeges, Kholbooljin (0.1mg/l ^{238}U), Davsan (0.132mg/l ^{238}U) and Bor Ovoo (0.118mg/l ^{238}U and 1.0mg/l Li) where cation ratio of $Na^{+}+K^{+}>Mg^{2+}>Ca^{2+}$ is dominant. It is shown that the recent hydrogeochemical changes of the lakes in the Valley of Lakes, including mineralization of the lake water and the abundance of Li and U in the water compositions of the lakes, is associated with the decrease in lake areas depending on vulnerability of lacustrine basins and response of Govi landscape to present warming. During the past 45 years, modern lakes encounter with the present rapid increase in temperature, water evaporation and drying up that induce the reduction in lake areas in the Valley of Lakes in southern Mongolia.